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CLAPBOARD SIDING PANEL WITH BUILT IN FASTENER SUPPORT

FIELD OF THE INVENTION

[0001] The present invention relates to siding products and methods of installing siding products, and more particularly to clapboard siding products and methods of installing the same.

BACKGROUND OF THE INVENTION

[0002] Typically, clapboard siding panels, such as fiber cement clapboard siding panels, are installed on a wall of a structure, generally on a sheathing product, in one of two ways – either in a so called "blind nail" method or a so called "face nail" method. In the blind nail method, illustrated by siding panel assembly 20 of FIG. 2, a first siding panel 16a is aligned on the face of a wall 12 and a series of horizontally spaced nails (not shown) is driven through the panel 16a, generally through an upper region of the exterior face of the panel 16a, into the wall 12. A second panel 16b is then secured to the wall 12 in the same manner using a series of nails 18. The second panel 16b overlaps a portion of the exterior face of the first panel 16a and covers the nails or fasteners driven through the first panel 16a. Another panel (not shown) is then installed overlapping panel 16b and covering nails 18.

[0003] In the face nailing method shown by panel assembly 10 of FIG. 1, the first siding panel 14a is properly aligned on the wall 12. A second siding panel 14b is then aligned overlapping the first siding panel 14a, as described above, and nails 18a are driven through both siding panels 14a, 14b, exposing the head of the nail 18a at the exterior surface of the second siding panel 14b. This process is repeated with subsequent siding courses, such as panels 14c and 14d shown in FIG. 1, using nails 18b and 18c.

[0004] FIG. 3 is a side cross-sectional view of the panel assembly 20 of FIG. 2. As can be seen from the cross-sectional view, the panels 16a and 16b of this assembly do not sit flush with the wall 12, i.e., a gap, illustrated generally by reference 22, exists between the siding panels and the wall 20 proximate to where nails 18 are driven through the panels. As explained above, fasteners 18 secure the panels to the wall 20. Because of the gap between the wall 20 and the siding panels, the fasteners apply a bending force to

the panel, both when being driven through the panels and after being secured to wall 20. This bending force stresses the panels and can lead to cracking. Further, the nails tend to fracture the rear surface of the panels as they puncture the rear surface and enter the gap area 22 between the rear surface of the panels and the wall, like a bullet exiting an object into free space. The stress cracks and fractures, in turn, can expose the panels to water, weaken the holding strength of the fasteners and generally reduce the product life of the panels. Similar problems are encountered with the assembly 10 of FIG. 1.

[0005] In light of the above, there is a need for a new siding panel system and panel configuration that reduce or eliminate stresses and fractures placed on the siding panel both during and after installation.

SUMMARY OF THE INVENTION

[0006] A generally rectangular siding panel is provided having a front and rear faces. The rear face has a first area proximate to a top end of the rear face and shaped such that at least a portion of the area sits substantially flush with a portion of a vertical wall when the siding panel is secured to the vertical wall and angled to overlap at least a portion of a second siding panel secured to the vertical wall.

[0007] Because at least a portion of the rear face, i.e., a first or protruding portion of the rear face, sits flush with the vertical wall, a gap proximate to the nail puncture and between the rear face and the wall is substantially eliminated and the wall provides support for the rear face during the nailing step. This support helps to reduce the fracturing or splintering of the rear face local to the nail puncture and helps to minimize bending of the siding panel as the nail is driven into the wall, thereby further reducing stresses that can lead to fractures in the siding panel. The reduction of fractures in the siding panel can reduce exposure of the siding panel to water damage and improve the strength of the connection between the siding panel and the wall, thereby improving the panel's wind load resistance.

[0008] In one embodiment, a generally rectangular shaped clapboard siding panel is provided having a front and rear faces, the rear face having a first area proximate to a top end of the rear face shaped such that at least a portion of the area sits substantially flush with a portion of a vertical wall when the siding panel is secured to the vertical wall

and angled to overlap at least a portion of a second siding panel secured to the vertical wall, such that the vertical wall provides support for the rear face when fasteners are driven through the clapboard siding panel and into the vertical wall through the first area. The first area can be reinforced, such as by thickening, fibrous, particle or resin reinforcement or by the addition of a reinforcing member, such as a metal mesh, scrim, fabric, or panel, for example, made of glass, graphite, plastic or metal, such as galvanized steel mesh or sheet metal. These reinforcements are preferably embedded or laminated to the panel at least on or in the first area.

[0009] A siding panel assembly is also provided including a first and a second siding panels attached to a vertical wall of a structure. Each of the siding panels has a generally rectangular shaped panel having a front and rear faces. The first siding panel is angled to overlap at least a portion of the second siding panel. The rear face of at least the first siding panel has a first area proximate to a top end of the rear face shaped such that at least a portion of the area sits substantially flush with a portion of the vertical wall.

[0010] A method of installing a siding panel assembly on a structure is also provided. A first and second siding panels are provided. Each of the siding panels has a generally rectangular shaped panel having a front and rear faces. The rear face of at least the first siding panel has a protruding area proximate to a top end of the rear face shaped such that at least a portion of the area sits substantially flush with a portion of the vertical wall when the first siding panel is secured to the wall and angled to overlap at least a portion of the second siding panel.

[0011] The above and other features of the present invention will be better understood from the following detailed description of the preferred embodiments of the invention that is provided in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings illustrate preferred embodiments of the invention, as well as other information pertinent to the disclosure, in which:

FIG.1 is a partial perspective view of a prior art face nail clapboard panel assembly;

FIG. 2 is a partial perspective view of a prior art blind nail clapboard panel assembly;

FIG. 3 is a side cross-sectional view of the assembly of FIG. 2;

FIG. 4 is a side elevational view of a clapboard siding panel according to the present invention;

FIG. 5 is a side cross-sectional view of a clapboard siding panel assembly utilizing the clapboard siding panel of FIG. 4;

FIG. 6 is a side elevational view of an alternative embodiment of a clapboard siding panel according to the present invention;

FIG. 6A is an enlarged view of a portion of the panel of FIG. 6; and

FIG. 7 is a side cross-sectional view of a clapboard siding panel assembly utilizing the clapboard siding panel of FIG. 6.

DETAILED DESCRIPTION

[0013] Referring first to FIG. 4, a side elevational view of a siding panel 100 is shown. Siding panel 100 has a generally rectangular shape, like the siding panels shown in the perspective views of FIGS. 1 and 2, and, in an exemplary embodiment, is a clapboard siding panel, preferably a fiber cement clapboard siding panel. "Fiber Cement" refers to a cementitious composition including Portland cement, cellulose fibers and aggregate (typically, sand). Siding panel 100 has front and rear faces 102 and 104, respectively. In one embodiment, the siding panel may be between about 12'-16' in length, as is conventional, with faces between about 5" to 16" in height. The siding panel has a thickness typically between about 1/8 to 1/2", and preferably around 3/16".

[0014] The panel 100 includes a first area 106 located proximate to the top edge 108 of the panel and preferably extending along the length of the rear face 104. The first area 106 is shaped such that a face of the area sits flush against a vertical wall 110 when a first siding panel 100a is secured to a wall 110 and angled to at least partially overlap a second siding panel 100b, as shown in the assembly 200 of FIG. 5. In one embodiment, the first area has a first planar face 106a that contacts the wall 110 during and after installation and a second face 106b that connects the first face to the remainder of the rear face 104. The first planar face 106a extends from the top edge 108 and forms an angle

"α" with the major portion of the rear face 104 of the siding panel. Angle α is selected such that the sum of angle α and angle "β" are preferably between about 170-190°, and more preferably about 180°, at installation where angle β is the angle between the major surface of rear face 104 and the wall 110 created when the panel is installed (as described below in connection with FIG. 5) to overlap another siding panel. Angle β is typically between about 1-10°, so angle α is preferably between about 170-179° so that the face 106a is substantially flush with the wall 110.

[0015] During installation of a panel 100, nails are driven through a siding panel to secure the panel to the wall after the panel is correctly positioned on a wall. In a conventional assembly, each nail is typically positioned within about an inch from the top edge 108. With respect to siding panel 100, it is preferred that the nails are driven through the first area 106 of the siding panel 100, and preferably through face 106a that sits flush with the vertical wall after the panel 100 is correctly positioned. For this reason, face 106a should have a height along rear face 104 of at least one inch.

[0016] During installation, a siding panel 100 is positioned on a wall 110 so that at least a portion of the first area 106 is flush with a portion of the wall 110, as shown in FIG. 5. A series of horizontally spaced nails 112 are then driven through the siding panel 100 and through the first portion 106 (specifically, through the face 106a that lies flush with the wall 110), and into the wall 110. Because the face 106a sits flush with the wall 110, the gap 22 proximate to the nail puncture is eliminated and the wall 110 provides support for the face 106a during the nailing step. This support prevents the fracturing or splintering of the rear face 104 local to the nail puncture and prevents bending of the siding panel as the nail 112 is driven into the wall 110. The reduction of fractures and other stresses in the siding panel can reduce exposure of the siding panel to water damage and improve the strength of the connection between the siding panel and the wall, thereby improving the panel's wind load resistance and product life.

[0017] Although FIG. 5 illustrates a siding panel assembly 200 having only two overlapping siding panels 100a, 100b, it should be understood that this is for purposes of illustration only. Also, although siding panel assembly 200 is shown assembled via the so called "blind nail" method, an assembly may also be formed using panels 100 via the "face nail" assembly method described above in the "Background of the Invention"

section. Similar panels are preferably, but not necessarily, used to form the assembly, i.e., each panel preferably has a respective first area 106 located on the rear face 104.

[0018] Although the siding panels illustrated herein are described as clapboard fiber cement siding panels, this is by no means a requirement. One of ordinary skill will realize that siding panels may be fabricated from a variety of materials other than fiber cement, such as wood or plastic, such as PVC, or composites thereof. It should also be apparent that, although not illustrated, the siding panel assembly described herein may include other products typically included in panel assemblies, such as sheathing, air and water barriers and insulation.

[0019] Fabrication of the panels 100 having first portion 106 described above may be accomplished using known fabrication techniques for manufacturing fiber cement or other clapboard siding panels. For example, first area shapes can simply be incorporated into the press or mold contour used to fabricate fiber cement clapboard siding panels. This manufacturing process is often referred to as "Post Press." Alternatively, an accumulator roll process, for example, may be utilized.

[0020] A method of installing a siding panel assembly on a structure is also provided herein. A first and second siding panels are provided. At least a first one of the siding panels is configured like a siding panel 100 described above, i.e., it has a first area 106 on a rear face thereof. First and second siding panels are attached to the structure such that the first area of the first siding panel sits substantially flush with the vertical wall of the structure when the first siding panel is angled to overlap at least a portion of the second siding panel. Nails are driven through the panels to secure the panels to the wall as described above in either the face or blind nail manner. Preferably, this process is repeated until the structure is covered with siding panels. As noted, the nails are preferably positioned so that they are driven through the portion of the first area that is flush with the wall of the structure, thereby providing a secure nailing surface and reducing or eliminating stress induced fracturing of the rear face of the siding panel.

[0021] FIG. 6 illustrates a siding panel 308 having first area 306 without a protruding area, described in connection with the panel 100 of FIG. 4, but angled to provide the flush seating with wall 110, as shown in the assembly 300 of FIG. 7. Panels 308a and 308b are installed in the manner described above for panels 100 in the assembly

200. Like panel 100, siding panel 308 has front and rear faces 302, 304 respectively and a longitudinal length. The rear surface 304 has a first portion of the rear face 304 forming an oblique angle β with respect to the exterior surface of vertical wall 110 to which the siding panels 308 are affixed. The rear surface 304 of the siding panels 308 also include a second portion in area 306 that is disposed in substantially flush contact with the vertical wall 110 when the siding panel 308 is affixed to the vertical wall 110. The portion of rear face that sits flush with wall 110 forms an angle α with the first portion of rear surface 304. The sum of angles α and β preferably total 180°, but may be in the range of about 170-190° so that the second portion is substantially flush with the wall 110. The second portion of the rear face in contact with the wall 110 preferably has a height of at least 1" so that nails or other fasteners may be driven through the same and into wall 110, thereby providing a secure nailing surface and reducing or eliminating stress induced fracturing of the rear face of the siding panel.

[0022] In one embodiment, the first area 306 (FIG. 6) (or 106 for panel 100) can be reinforced, such as by thickening, fibrous, particle or resin reinforcement or by the addition of a reinforcing member, such as a metal mesh, scrim, fabric, or panel, for example, made of glass, graphite, plastic or metal, such as galvanized steel mesh or sheet metal. These reinforcements are preferably embedded or laminated to the panel on or in the first area as taught in, for example, U.S. Patent Application Serial No. 10/288,189 to William P. Bezubic Jr., filed November 5, 2002, entitled "Cementitious External Sheathing Member with Rigid Support Member" commonly assigned to the assignee of the present application, the entirety of which is hereby incorporated by reference herein.

[0023] Bezubic Jr. teaches that a rigid support member 400 may be bonded with a fiber cement material, as shown in the enlarged partial side view of the panel 308 (FIG. 6A). The enlarged view of FIG. 6A illustrates fiber cement panel 308 as including plurality of laminated layers with a support member 400 bonded to the rear surface 304 at last along a portion of rear surface 304 at the first area 306. Bezubic Jr. provides that the support member 400 may includes a rigid polymer resin, such as, rigid polyvinyl chloride ("PVC"), fiberglass-reinforced epoxy or polyester, or a metal plate, sheet or lath. Suitable metallic materials include anodized or polymer-coated aluminum or copper, brass, bronze, stainless steel, or galvanized steel, in plate, sheet or lath form. If

aluminum is selected, it should be coated wherever it comes in contact with the cementitious material, since it is prone to attack by alkali compositions. Similarly, carbon steel selections should be coated or galvanized in order to prevent rusting. The metal plate or lath can be roll formed and punched in order to provide through-holes for fasteners. If a lath, scrim, or mesh construction is used, separate holes may not be necessary since the open construction of a lath, scrim, or mesh is ideal for mechanically locking with the cementitious layer of the panel 308 and is easily penetrated by fasteners such as nails and screws. With lath or scrim constructions, embedding the support member within the cementitious layer of the panel 308 is an option, in which case, the rigid support member may contain corrugations, grooves perforations or ridges to assist in mechanically locking with the cementitious layer of the panel.

[0024] As noted, Bezubic Jr. also teaches the use of reinforcing additives within the fiber cement structure. These additives are shown as fibers 402 in FIG. 6A. These fibers may be added to the cementitious layers of the panel 308 in order to increase the interlaminar bond strength, compressive, tensile, flexural, and cohesive strengths of the unhardened wet material as well as the hardened panels made therefrom. Fibers should preferably have high tear and burst strengths (i.e., high tensile strength), examples of which include waste paper pulp, abaca, southern pine, hardwood, flax, bagasse (sugar cane fiber), cotton, and hemp. Fibers with a high aspect ratio of about 10 or greater work best in imparting strength and toughness to the moldable material.

[0025] In U.S. Patent Application Serial No. 10/342,529 to William P. Bezubic Jr. and Claude Brown Jr., filed January 15, 2003, entitled "Cementitious External Sheathing Member Having Improved Interlaminar Board Strength" (Bezubic II), commonly assigned to the assignee of the present application, the entirety of which is hereby incorporated by reference herein, the Applicants teach the introduction of a resinous bond promoter, such as acrylic, starch, polyvinyl alcohol, or polyvinyl acetate, a rheological agent, or the use of mechanical means described below to improve the strength between individual layers of cementitious material. Sufficient resinous additions, manipulation of the fiber, or both, can result in improvements to ILB (inter-laminate board) strength. In addition to resinous bond promoters and rheological agents, Bezubic II proposes the use of mechanical manipulation of the wood fiber so that the

individual fibers can be oriented in a "z" direction between layers to improve ILB strength. In addition to using the suggested additives, or apart therefrom, Bezubic II proposes the use of a series of pins, partially or fully disposed within the layer or layers of the fiber cement product to pierce the sheet and displace the fibers perpendicular to the direction of the forming machine, thus allowing the fibers to join the sheets together. Bezubic II also teaches employing further, or alternatively, a piercing wheel, punching die, vibration table, needling equipment, or a smoother surface such as a roll or plate that can be used to upset the fiber location on each, or selective ones, of the layers of the fiber cement product.

[0026] Although the invention has been described in terms of exemplary embodiments, it is not limited thereto. Rather, the appended claims should be construed broadly to include other variants and embodiments of the invention that may be made by those skilled in the art without departing from the scope and range of equivalents of the invention.